L25 ANSWER 2 OF 40 WPIX
AN 1999-141712 [12] WPIX
DNN N1999-103000
TI **Fast spin echo** motion artifact reduction type magnetic resonance imaging system - allows maintenance of inter-echo spacing.
DC P31 S05 W04
IN STECKNER, C M
PA (PXRM) PICKER INT INC
CYC 1
PI US 5865747 A 19990202 (199912)* 7p A61B005-055 <--
ADT US 5865747 A Provisional US 1996-17355P 19960426, US 1997-837704 19970422
PRAI US 1996-17355P 19960426; US 1997-837704 19970422
IC ICM **A61B005-055**
AB US 5865747 A UPAB: 19990503

A magnet generates temporally constant magnetic field through an examination region (14). A transmitter (24) excites dipoles in the examination region such that radio frequency resonance signals are generated. Gradient amplifiers (20) and gradient coils (22) are provided for generating phase and lead magnetic field **gradient** pulses along **orthogonal** axes across the examination region. The transmitter and the gradient amplifiers are controlled by a sequence controller (40) to cause excitation followed by echo generation for generating sets of views. The radio frequency magnetic resonance signals read during the read gradients are received and demodulated by a receiver (38) to produce the sets of views. A receiver gating circuit connected to the sequence controller, controls the receiver to process even numbered echoes and odd numbered echoes which occur after a threshold number of echoes. A reconstruction processor reconstructs the sets of rows into image representations which are then stored in an image memory.

USE - None given.

ADVANTAGE - Reduces **fast spin echo** motion artifacts while maintaining inter-echo spacing same as an uncompensated **FSE** sequence. Reduces gradient demands and eddy current and increases signal to noise ratio. The figure shows the magnetic resonance imaging system. Examination region (14), Gradient amplifier (20), Gradient coil (22), Transmitter (24), Receiver (38), Sequence controller (40).

Dwg.1/2

L25 ANSWER 4 OF 40 WPIX

AN 1998-288856 [26] WPIX
DNN N1998-227161
TI Magnetic resonance imaging system applicable in conjunction with **fast-spin echo** imaging, such as single shot imaging - has transmitter and gradient amplifiers which transmit radio frequency and current pulses to selected pairs of whole body gradient coils to create magnetic field gradients along axes of examination region.
DC P31 S01 S03 T01
IN BEARDEN, F H; DEMEESTER, G D; LIU, H
PA (PXRM) PICKER INT INC
CYC 26
PI EP 845684 A1 19980603 (199826)* EN 19p G01R033-561
R: AL AT BE CH DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
JP 10155769 A 19980616 (199834) 14p A61B005-055 <--
US 5825185 A 19981020 (199849) G01V003-00 <--
ADT EP 845684 A1 EP 1997-309010 19971110; JP 10155769 A JP 1997-325703 19971127; US 5825185 A US 1996-757153 19961127
PRAI US 1996-757153 19961127
IC ICM **A61B005-055**; G01R033-561; **G01V003-00**
ICS **G01R033-48**

AB EP 845684 A UPAB: 19980701
The magnetic resonance imaging system (10) includes a magnet (14) for generating temporally constant magnetic field through an examination region (16), a radio frequency pulse controller and transmitter (24) for both exciting and manipulating magnetic dipoles in the examination region, with the excitation of the magnetic dipoles being cyclic with repeat time (TR), and gradient magnetic field coils (22) and a gradient magnetic field controller (20) for generating at least phase and read magnetic field **gradient** pulses in **orthogonal** directions across the examination region such that radio frequency magnetic resonance echoes are generated. A receiver (26) receives and demodulates the radio frequency magnetic resonance echoes to produce a series of data lines, and an image processor (80-132) reconstructs an image representation from the data lines, in which there is provided a phase-correction parameter generator (86) which generates a number of phase-correction vectors.

The phase correction generator includes an echo centre position processor (96) for calculating the relative echo centre position for each of a number of echo positions in the repeat time of the sequence. A complex sum processor (104) receives the echo centre positions and calibrates data lines from the echo positions and independently computes a complex phase correction vector from it for each of the echo positions, and a correction processor (116) corrects each imaging data line with a positionally corresponding one of the correction vectors prior to reconstruction of the image representation. The phase-correction parameter generator includes a multiplication circuit (90) which multiplies a Fourier transformed reference echo data line, pixel by pixel, by a complex conjugate calibration data line corresponding to each one of the echo positions or may include a one-dimensional inverse Fourier transform processor (92) for receiving data lines from the multiplication circuit and processing the data lines corresponding to each echo position to generate an auxiliary data array in time domain for all echo positions.

ADVANTAGE - Improved phase correction is provided, line artifacts in phase encode direction are reduced or eliminated, and additional hardware and hardware modifications are not required. Image quality is improved, by improving spatial resolution and reducing Gibbs ringing and distortion.
Dwg.2A/6

FS EPI GMPI

L25 ANSWER 36 OF 40 JAPIO COPYRIGHT 2001 JPO
AN 1999-216129 JAPIO
TI SUPER HIGH SPEED MULTIPLE SECTION WHOLE-BODY MRI USING GRADIENT AND **SPIN ECHO** (GRASE) IMAGING
IN FEINBERG DAVID A; OSHIO KOICHI
PA BRIGHAM & WOMENS HOSPITAL INC:THE
PI **JP 11216129** A 19990810 Heisei
AI JP1998-312603 (JP10312603 Heisei) 19981102
PRAI US 1991-727229 19910705
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 99
IC ICM A61B005-055
ICS G01R033-48

AB PROBLEM TO BE SOLVED: To provide a practical MRINMR pulse sequence by joining gradient echo to spin echo effectively.
SOLUTION: This is a method that detects MRI signal from NMR nuclear type for animal excluding human being. Nuclears are made to perform a precession to start TR interval. And, 180° NMR RF pulse is impressed repeatedly substantially at 180° with successive equal time interval in the same TR interval. And, more precession of the nuclears is performed to generate a series of NMR spin echo. Each of the equal time interval starts the TR interval, next, the interval between the first 180° NMR RF pulse is made substantially twice. Only after the each 180° NMR RF pulse, more than one alternate polarity readout gradient magnetic field pulse are impressed to generate the more than one subsequence of gradient echo.

L25 ANSWER 39 OF 40 HCAPLUS COPYRIGHT 2001 ACS
AN 1981:217005 HCAPLUS
DN 94:217005
TI **Driven equilibrium** solid and liquid **spin-echo** NMR sequences
AU Cosgrove, T.; Barnett, K. G.
CS Sch. Chem., Univ. Bristol, Bristol, BS8 1TS, Engl.
SO J. Magn. Reson. (1981), 43(1), 15-20
CODEN: JOMRA4; ISSN: 0022-2364
DT Journal
LA English
CC 73-4 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties)
AB Several new versions of **driven equil.** pulsed NMR expts. were developed to measure the relaxation times of polymers adsorbed on solid surfaces from soln. In particular these sequences enable the sepn. of signals resulting from 2 phases, one with strong dipolar coupling (a solid) and one with very weak dipolar coupling (a liq.) in systems with large unwanted solvent signals.
ST **spin echo** NMR adsorbed polymer; spin lattice relaxation adsorbed polymer
IT Magnetic relaxation
(of polymers adsorbed on solid, detd. by **driven equil**

L26 ANSWER 7 OF 10 HCAPLUS
AN 1992:603776 HCAPLUS
DN 117:203776
TI Application of DEFT and SEFT for signal-to-noise ratio enhancement and T2-selective spectra in silicon-29 MAS NMR of zeolites
AU Anderson, Michael W.
CS Dep. Chem., UMIST, Manchester, M60 1QD, UK
SO Magn. Reson. Chem. (1992), 30(9), 898-904
CODEN: MRCHEG; ISSN: 0749-1581
DT Journal
LA English
CC 77-7 (Magnetic Phenomena)
AB **Driven equil.** and **spin-echo** Fourier transform spectroscopy (DEFT and SEFT) were used to observe 29Si high-resoln. solid-state NMR with magic-angle spinning (MAS NMR) spectra of zeolites. The sequences allow the measurement of T2 relaxation times, dramatic improvements in signal-to-noise ratios and selective observation of signals with long T2 relaxation times. This last criterion permits the simplification of 29Si spectra of highly aluminous zeolites, yielding important crystallog. information.
ST silicon 29 NMR zeolite; spin spin nuclear relaxation zeolite
IT Nuclear magnetic resonance
(of zeolites, silicon-29)
IT Zeolites, properties

L25 ANSWER 40 OF 40 HCAPLUS
AN 1972:106067 HCAPLUS
DN 76:106067
TI Fourier transform nuclear magnetic resonance. II. **Driven equilibrium** fourier transform and **spin-echo** Fourier transform
AU Jones, Daniel E.
CS Am. Cyanamid Co., Stamford, Conn., USA
SO J. Magn. Resonance (1972), 6(2), 183-90
CODEN: JOMRA4
DT Journal
LA English
CC 73 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties)
AB A detailed treatment of signal-to-noise in **driven equil**. Fourier transform and **spin-echo** Fourier transform NMR methods is presented. The optimization equations presented are used to calc. theoretical signal-to-noise values for comparison of these 2 pulse methods and for comparisons with repetitive pulse Fourier transform NMR. When resolution is of primary importance, repetitive pulse Fourier transform NMR will most often be the best method of the 3; if sensitivity is primary, **driven equil**. Fourier transform NMR would be the method of choice. **Spin-echo** Fourier transform NMR offers simpler phase corrections with only slightly inferior sensitivity to the **driven equil**. Fourier transform NMR.
ST Fourier transform NMR; **driven equil** Fourier transform;

AN 2000-491799 [44] WPIX
DNN N2000-364917
TI Magnetic resonance imaging process - creates measurement cycle of series of pulse sequences with HF excitation pulse and magnetic field gradient pulse to rephase core magnetization of object being investigated.
DC P31 S01 S03 S05
IN HEID, O
PA (SIEI) SIEMENS AG
CYC 2
PI DE 19903029 A1 20000803 (200044)* 4p G01R033-54 <--
JP 2000217801 A 20000808 (200052) 4p A61B005-055 <--
ADT DE 19903029 A1 DE 1999-19903029 19990126; JP 2000217801 A JP 2000-13354 20000121
PRAI DE 1999-19903029 19990126
IC ICM **A61B005-055; G01R033-54**
ICS **G01R033-48**

AB DE 19903029 A UPAB: 20000913
Pulse sequences are formed with a HF excitation pulse and magnetic field gradient pulse to completely rephase the core magnetization of an object caused by the HF excitation pulse. The pulse creation is interrupted and later started anew after a fixed number of measurement cycles showing repetitions and before reaching a driven steady state of the core magnetization.

Between the series of measurement cycles there are measurement breaks for the relaxation of the core magnetization in the thermal stead state. Before the start of each measurement cycle, a preparation pulse sequence is created to prepare the object to be investigated. The preparation process involves a fat saturation process using an inversion recovery procedure, a saturation pulse procedure, a **driven equilibrium** Fourier transformation procedure or a diffusion pulse procedure.

USE - For imaging of abdomen, pleural cavity where movement of patient is unavoidable.

ADVANTAGE - Short measurement times and good tissue contrast.
Dwg.1/1

L26 ANSWER 2 OF 10 WPIX
AN 1988-360860 [50] WPIX
DNN N1988-273295
TI Measurement of capillary blood flow using nuclear magnetic resonance - applying RF pulses to nuclear in magnetic field having large gradient, and obtaining two images with different spatial periodicity.
DC S01 S02 S03 S05
IN HAWKES, R C; PATZ, H S
PA (BRIG-N) BRIGHAM WOMEN HOSP
CYC 1
PI US 4788500 A 19881129 (198850)* 14p
ADT US 4788500 A US 1987-103467 19871001
PRAI US 1985-765528 19850814; US 1987-103467 19871001
IC **G01R033-20**
AB US 4788500 A UPAB: 19930923
Very slow flow rates are measured by steady state free precession, in which a sequence of radio frequency pulses are applied to nuclei in a magnetic field having a substantial gradient. A **driven equilibrium** state is obtained and, there is a spatial periodicity in the magnetisation response of the nuclei. Two images are generated.

The spatial periodicity, and the NMR response of flowing nuclei to the spatial periodicity, is different during the two image formations. One image is subtracted from the other, which cancels signals from static nuclei in the signal. The subtraction difference is proportional only to nuclei which are part of relatively slowly flowing liquids.

ADVANTAGE - Accurate imaging of low flow rates. Full information content is retrieved from relaxation signal.
1/6
FS EPI

L28 ANSWER 3 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 1998:155727 HCAPLUS
DN 128:265218
TI Signal-to-noise enhancement when T2 .noteq. T1, a new investigation of the pulse sequence **DEFT**
AU Carlotti, C.; Taulelle, F.; Aubay, E.
CS RMN CHim. Solide, UMR, CNRS, Univ. Louis Pasteur, Strasbourg, 67070, Fr.
SO J. Chim. Phys. Phys.-Chim. Biol. (1998), 95(2), 208-215
CODEN: JCPBAN; ISSN: 0021-7689
PB EDP Sciences
DT Journal
LA English
CC 77-7 (Magnetic Phenomena)
Section cross-reference(s): 68
AB Very long exptl. times are necessary to obtain NMR spectra when the obsd. nuclei present important spin-lattice relaxation times. **DEFT** sequence allows for redn. of acquisition time though increasing the signal to noise ratio. An anal. approach is proposed for which optimal conditions of usage was defined for the special case of T2.mchlt.T1. To obtain full maximization it is necessary to use linear prediction. At least a 2-dimensional exchange expt. using **DEFT** is presented.
ST NMR spin lattice relaxation signal noise; silica soln dynamics Fourier transform NMR

L26 ANSWER 8 OF 10 HCAPLUS COPYRIGHT 2001 ACS
AN 1987:42740 HCAPLUS
DN 106:42740
TI Reversing residual transverse magnetization due to phase-encoding magnetic field gradients
IN Glover, Gary Harold; Pelc, Norbert Joseph
PA General Electric Co., USA
SO Eur. Pat. Appl., 24 pp.
CODEN: EPXXDW
DT Patent
LA English
IC ICM **G01N024-08**
CC 77-7 (Magnetic Phenomena)
Section cross-reference(s): 9
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 188006	A2	19860723	EP 1985-116665	19851231
	EP 188006	A3	19870527		
	EP 188006	B1	19900228		
	R: CH, DE, FR, GB, IT, LI, NL, SE				
	FI 8504524	A	19860708	FI 1985-4524	19851115
	JP 61181950	A2	19860814	JP 1985-292392	19851226
	JP 03049257	B4	19910729		
PRAI	US 1985-689428		19850107		

AB A method for reversing residual transverse magnetization due to spatial-encoding magnetic field gradient pulses, used in magnetic resonance imaging to encode spatial information, employs a reversing gradient pulse applied in the same direction as the encoding gradient pulse, following the observation of the **spin-echo** signal. The encoding gradient pulse is applied following the 180.degree. radio-frequency pulse to avoid the effects of assocd. imperfection. In 1 embodiment the amplitudes of the encoding and reversing gradient pulses are selected to be approx. the neg. of each other so as to substantially cancel the residual magnetization. In another embodiment, the amplitude of the reversing gradient pulse is selected such that the algebraic sum with the corresponding amplitude of the encoding gradient pulse is a const. In this case, the residual magnetization is not necessary cancelled, but is left in the same state after each view of the pulse sequence. The method is applicable to multiple-echo and **driven equil**. pulse sequences.
ST NMR transverse magnetization residue reversal; tomog transverse

L26 ANSWER 6 OF 10 JAPIO COPYRIGHT 2001 JPO
AN 2000-217801 JAPIO
TI MAGNETIC RESONANCE IMAGING METHOD
IN HEID OLIVER DR
PA SIEMENS AG
PI JP 2000217801 A 20000808 Heisei
AI JP2000-013354 (JP2000013354 Heisei) 20000121
PRAI DE 1999-19903029U 19990126
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000
IC ICM **A61B005-055**
ICS **G01R033-48**

AB PROBLEM TO BE SOLVED: To make measuring time as short as possible in a magnetic resonance imaging method and to provide tissue contrast that serves for physiological diagnosis.

SOLUTION: A pulse sequence is generated having both an HF excitation pulse and a magnetic field gradient pulse for completely rephasing the nuclear magnetization of the subject of inspection which is induced by the HF excitation pulse; in that case, a measuring cycle is interrupted after the repetition of a fixed number of consecutive pulse sequences and before the arrival of the nuclear magnetization at a **driven equilibrium** state (steady state) and is newly started thereafter.

L26 ANSWER 3 OF 10 WPIX
AN 1987-064917 [09] WPIX
DNN N1987-049131
TI Producing image by NMR technique - using different time intervals between application of radio frequency pulses so as to cancel out any static nuclei.
DC S03 S05
IN HAWKES, R C; PATZ, H S
PA (BRIG-N) BRIGHAM & WOMENS
CYC 13
PI WO 8701208 A 19870226 (198709)* EN 30p
RW: AT BE CH DE FR GB IT LU NL SE
W: AU JP
AU 8662228 A 19870310 (198721)
EP 232387 A 19870819 (198733) EN
R: AT BE CH DE FR GB IT LI
ADT WO 8701208 A WO 1986-US1693 19860813; EP 232387 A EP 1986-905128 19860813
PRAI US 1985-765528 19850814; US 1987-103467 19871001
REP 1.Jnl.Ref; US 4015196; US 4115730; US 4165479; US 4516582; US 4565968; US 4602641
IC **G01R033-20**
AB WO 8701208 A UPAB: 19930922
A sequence of radio frequency pulses are applied to nuclei in a magnetic field having an adequate gradient, so that a spatial periodicity in the magnetisation of the nuclei is established. The nuclei reach a state of **driven equilibrium** by application of radio frequency pulses to the sample.

Two images are generated, using different time intervals between the application of the radio frequency pulses. One image is subtracted from the other, cancelling out any static nuclei in the signal and relatively fast flowing nuclei never reach equilibrium state. This obtains a difference image in which the image elements are each determined solely by the nuclear magnetic resonance of nuclei in slowly flowing fluids in the sample.

ADVANTAGE - Can measure very slow blood flow in capillaries.
1/6
FS EPI

L28 ANSWER 4 OF 8 HCAPLUS COPYRIGHT 2001 ACS
AN 1989:150607 HCAPLUS
DN 110:150607
TI SNR improvement in NMR microscopy using **DEFT**
AU Maki, J. H.; Johnson, G. A.; Cofer, G. P.; MacFall, J. R.
CS Med. Cent., Duke Univ., Durham, NC, 27710, USA
SO J. Magn. Reson. (1988), 80(3), 482-92
CODEN: JOMRA4; ISSN: 0022-2364
DT Journal
LA English
CC 8-9 (Radiation Biochemistry)
AB This paper examines the use of a **driven equil**. Fourier transform (**DEFT**) pulse sequence for improving the signal per unit time and hence image resoln. in NMR microscopy. **DEFT** vs. partial satn. (PS) in modeled and it is shown that **DEFT** is most useful in physiol. materials provided short TE values (TE .mchlt. T2) and short TR values (TR < T1) are used. Under these conditions, **DEFT** can yield up to a 4-fold signal increase compared to PS. It is shown that **DEFT** can provide spin d. and T1/T2-ratio-weighted images. **DEFT** is also shown to have SNR (signal-to-noise ratio) advantages as T1 increases, an important consideration at higher magnetic fields. Exptl. data that verify the theor. predictions and the functioning of a **DEFT** pulse sequence to produce high-quality 2-dimensional spin-warp images of a phentom are presented. Studies performed on small animals demonstrate the utility of the **DEFT** sequence in MR microscopy by providing increased SNR and new contrast mechanisms over limited fields of view.
ST NMR imaging **driven equil** Fourier transform
IT Lung
(NMR imaging of, using **driven equil**. Fourier

L26 ANSWER 4 OF 10 WPIX COPYRIGHT 2001 DERWENT INFORMATION LTD
AN 1986-190882 [30] WPIX
DNN N1986-142653
TI NMR residual magnetisation cancellation method - applies reverse gradient pulse to phase encoding field such that algebraic sum is zero.
DC S03 S05
IN GLOVER, G H; PELC, N J
PA (GENE) GENERAL ELECTRIC CO
CYC 10
PI EP 188006 A 19860723 (198630)* EN 25p
R: CH DE FR GB IT LI NL SE
FI 8504524 A 19860708 (198643)
US 4665365 A 19870512 (198721)
EP 188006 B 19900228 (199009) EN
R: CH DE FR GB LI NL
DE 3576209 G 19900405 (199015)
ADT EP 188006 A EP 1985-116665 19851231; US 4665365 A US 1985-689428 19850107
PRAI US 1985-689428 19850107
REP A3...8721; EP 127850; EP 128424; No-SR.Pub; EP 135847; EP 175184; EP 185194; EP 91008
IC **G01N024-08; G01R033-20**
AB EP 188006 A UPAB: 19930922
In a nuclear magnetic resonance system, the (Gy) spatial phase-encoding gradient pulse is applied in internal (4). Since delaying the application of the phase-encoding pulse may increase the min. echo delay. However the rephasing (Gy) reverse gradient pulse in interval (6) is highly effective in reversing the residual magnetization effects due to the earlier (Gy) pulse. The encoding gradient pulse (Gy) is applied following the 180 degree RF pulse to avoid the associated imperfections.

The reversing and phase encoding radient amplitudes are chosen so as to return the residual transverse magnetization to the state it would be in if no phase-encoding gradient and reversing gradient pulses should be equal to a constant, chosen in this case to be zero.

USE - With magnetic field gradient pulses used to encode spatial information.
1/8
ABEQ EP 188006 B UPAB: 19930922
A method for undoing the effect of magnetic field gradients on the residual transverse magnetisation in a pulse sequence useful for producing images of a study object positioned in a homogenous magnet field, which pulse sequence includes a prdeetermined plurality of sequentially implemented views, each of said views including at least on RF excitation pulse for exciting nuclear spins in the object, one 180 deg. RF pulse for generating a **spin-echo** signal, and at least one encoding magnetic field gradient pulse used to encode spatial information into said **spin-echo** signal, characterised by applying said encoding magnetic field gradient pulse subsequent to the irradiation of the study object with said 180 deg. RF pulse, but prior to the occurrence of said **spin-echo** signal, said encoding magnetic field gradient pulse being applied along at least on directional axis of the study object; and applying, following the occurrence of said **spin-echo** signal, a reversing magnetic field gradient pulse so as to undo the effects of the encoding magnetic field gradient pulse on any residual transverse magnetisation, the amplitude of said reversing and encoding gradient pulses being selected such that the algebraic sum thereof along said one axis is equal to constant.
ABEQ US 4665365 A UPAB: 19930922
The method employs a reversing gradient pulse applied in the same direction as the encoding gradient pulse following the observation of the **spin-echo** signal. The encoding gradient pulse is applied following the 180 deg. RF pulse. The amplitudes of the encoding and reversing gradient pulses may be selected to be approx. the negatives of

each other so as to substantially cancel the residual magnetization.

The amplitude of the reversing gradient pulse may, alternatively be selected such that the algebraic sum with the corresp. amplitude of the encoding gradient pulse is a constant. In this case, the residual magnetization is not necessarily cancelled, but rather is left in the same state after each view of the pulse sequence.

USE - Applicable to multiple-echo and **driven equilibrium** pulse sequences.

FS EPI

FA AB